Course Syllabus: Concepts of Science

College of Education
GNSC 3104-201 (with Lab)
Spring 2022

Contact Information

Instructor: **Dr. Timothy Hinchman**
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Office Hours: Monday 10:30-11:00am, Tuesday 8am- 10:30am, and Thursday 8am-10:00am (others available by appointment)
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Preferred Form of Communication**:** Email

Instructor Response Policy

Communication Response Time: Within 24 hours Monday- Friday, Within 48 hours on the weekend.

Textbook & Instructional Materials

The following textbook is recommended for this course:

Tillery, B. W., Enger, E. D., & Ross, F. C. (2022). *Integrated science*. McGraw-Hill.

Course Description

The curriculum will emphasize the interaction of the science disciplines and feature the fundamental principles of physical, biological and earth sciences for all levels of teaching science. Creditable only for students seeking an education certification in science.

Course Objectives/Learning Outcomes/Course Competencies

1. TEXES EC-6 Core Subjects Standard Competencies:
    a. **SCIENCE STANDARD I- The science teacher manages classroom, field and laboratory activities to ensure the safety**

of all students and the ethical care and treatment of organisms and specimens.

b. **SCIENCE STANDARD II- The science teacher understands the correct use of tools, materials, equipment and technologies.**
c. **SCIENCE STANDARD III- The science teacher understands the process of scientific inquiry and its role in science instruction.**
d. **SCIENCE STANDARD VI- The science teacher understands the history and nature of science.**
e. **SCIENCE STANDARD VII- The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions.**
f. **SCIENCE STANDARD VIII- The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in physical science.**
g. **SCIENCE STANDARD IX- The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in life science.**
h. **SCIENCE STANDARD X- The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in Earth and Space science.**
i. **SCIENCE STANDARD XI- The science teacher knows unifying concepts and processes that are common to all sciences.**

See Appendix A for a complete list of standards/competencies (if applicable) and Appendix B for assignment/standards alignment matrix

Study Hours and Tutoring Assistance

Located in Moffett Library, The Office of Tutoring and Academic Support Programs (TASP) offers a variety of resources designed to help students meet the demands of the college classroom. Their mission is to provide the necessary support to help students achieve academic success. This can be completing in-person and through distance learning. MSU-Texas-Tutoring

Student Handbook

Refer to: Student Handbook-2020-21

Academic Misconduct Policy & Procedures
Academic Dishonesty: Cheating, collusion, and plagiarism (the act of using source material of other persons, either published or unpublished, without following the accepted techniques of crediting, or the submission for credit of work not the individual's to whom credit is given). Additional guidelines on procedures in these matters may be found in the Office of Student Conduct.
Office of Student Conduct

Grading/Assessment

Course Grade- List all graded assignments (for all certification courses at least one assessed performance-based assignment is required) with their point value and or percentage of total grade. Letter Grade Scale indicate the overall points or % to letter grade scale for example 1270 to 1137=A.

Table 1: Points allocated to each assignment – You can change table information but will need to use table tool if you add more columns or rows. Do not leave any blanks in table. Follow instructions listed under Course Schedule.

Assignments	Points
Science Notebook	200
Lab Safety Module	50
Module Tests	600
Comprehensive Final Exam	150
Total Points	1000

Table 2: Total points for final grade.

Grade	Points
A	900-1000
B	800 to 899
C	700 to 799
D	600 to 699
F	Less than 600

Homework

Each module will require the student to read the chapter, take classroom notes, summarize those notes, create study guides, and create a comprehensive science notebook. There are three main steps in the notebook set-up process:

- STEP 1: Table of Contents
- STEP 2: Page numbering
- STEP 3: Headings and types of entries.
- Each scientist's notebook is unique to that individual, area of inquiry, kind of experiment, and investigation. Science notebooks are designed after the way scientists really operate, and each scientist's notebook is unique to that person, area of inquiry, type of experiment, and study. In a continuous record of their thinking, student scientists keep track of their

observations, thoughts, drawings, and other illustrations such as charts, tables, models, and graphs, as well as their questions, ideas, and comments.

Assessments

This course will feature four module tests, one online lab safety test, and a comprehensive final examination.

Module 1 Test will cover Chapters 1-4
Module 2 Test will cover Chapters 5-9
Module 3 Test will cover Chapters 12-17
Module 4 Test will cover Chapters 21, 23, 24, and 26

The Final examination will cover Chapters 1-9, 12-17, 21, 23, 24, and 25.

Students will bring their Science Notebooks to the testing date for assessment. The notebooks will be handed back at the conclusion of your Module tests.

Late Work

Because all assessments are conducted in class, "make up" work should not be an issue. A make up test will not be offered unless a written medical or equally extenuating circumstance is provided.

Important Dates

Last day for term schedule changes: January 13, 2022
Deadline to file for graduation: February 14, 2022
Last Day to drop with a grade of "W:" March 21, 2022
Refer to: Drops, Withdrawals & Void

Desire-to-Learn (D2L)

Extensive use of the MSU D2L program is a part of this course. Each student is expected to be familiar with this program as it provides a primary source of communication regarding assignments, examination materials, and general course information. You can log into D2L through the MSU Homepage. If you experience difficulties, please contact the technicians listed for the program or contact your instructor.

Attendance

WCOE Face to Face Policy: Professionals are dependable, reliable, and responsible. Therefore, candidates are expected to be on time and in attendance at every class, and to stay for the entire class. Tardiness, leaving early, and excessive absences (3) are considered evidence of lack of dependability, and are taken seriously. Candidates will receive a grade of F on the third offense. If a candidate is taking 'blocked' courses that are taught at a Professional Development School, requiring field experience, the candidate will be dropped

with an F from those classes as well. Attendance and class activity participation grades will be recorded in the Dispositions category.

Computer Requirements

Taking an online or hybrid class requires you to have access to a computer (with Internet access) to complete and upload your assignments. It is your responsibility to have (or have access to) a working computer in this class. ***Assignments and tests are due by the due date, and personal computer technical difficulties will not be considered reason for the instructor to allow students extra time to submit assignments, tests, or discussion postings.*** Computers are available on campus in various areas of the buildings as well as the Academic Success Center. **Your computer being down is not an excuse for missing a deadline.** There are many places to access your class. D2L can be accessed from any computer in the world that is connected to the internet. Contact your instructor immediately upon having computer trouble. If you have technical difficulties in the course, there is also a student helpdesk available to you. The college cannot work directly on student computers due to both liability and resource limitations however they are able to help you get connected to our online services. For help, log into D2L**.**

Change of Schedule

A student dropping a course (but not withdrawing from the University) within the first 12 class days of a regular semester or the first four class days of a summer semester is eligible for a 100% refund of applicable tuition and fees. Dates are published in the Schedule of Classes each semester.

Refund and Repayment Policy

A student who withdraws or is administratively withdrawn from Midwestern State University (MSU) may be eligible to receive a refund for all or a portion of the tuition, fees and room/board charges that were paid to MSU for the semester. HOWEVER, if the student received financial aid (federal/state/institutional grants, loans and/or scholarships), all or a portion of the refund may be returned to the financial aid programs. As described below, two formulas (federal and state) exists in determining the amount of the refund. (Examples of each refund calculation will be made available upon request).

Services for Students with Disabilities

In accordance with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, Midwestern State University endeavors to make reasonable accommodations to ensure equal opportunity for qualified persons with disabilities to participate in all educational, social, and recreational programs and activities. After notification of acceptance, students requiring accommodations should make application for such assistance through Disability Support Services, located in the Clark Student Center, Room 168, (940) 397-4140. Current documentation of a disability will be required in order to provide

appropriate services, and each request will be individually reviewed. For more details, please go to Disability Support Services.

College Policies

Campus Carry Rules/Policies
Refer to: Campus Carry Rules and Policies

Smoking/Tobacco Policy
College policy strictly prohibits the use of tobacco products in any building owned or operated by MSU TEXAS Adult students may smoke only in the outside designated-smoking areas at each location.

Alcohol and Drug Policy
To comply with the Drug Free Schools and Communities Act of 1989 and subsequent amendments, students and employees of Midwestern State are informed that strictly enforced policies are in place which prohibits the unlawful possession, use or distribution of any illicit drugs, including alcohol, on university property or as part of any university-sponsored activity. Students and employees are also subject to all applicable legal sanctions under local, state and federal law for any offenses involving illicit drugs on University property or at University-sponsored activities.

Grade Appeal Process

Update as needed. Students who wish to appeal a grade should consult the Midwestern State University MSU Catalog

Notice
Changes in the course syllabus, procedure, assignments, and schedule may be made at the discretion of the instructor.

Course Schedule:

Course outline with assigned course topics, assigned readings, and assignments are required for certification courses.
Use this area to tell the students what is scheduled for the duration of the class. Please note the disclaimer above and include that with your schedule. There can be no blanks in your table. You must put some kind of text in all the blanks such as: N/A or No content. (Use the same color text as background if you want to keep it uncluttered for your sighted learners). Tables must not extend to another page (cannot be wider than the page). If it is going to extend to next page, you will need to create another table with heading. You can use a dash (-) or "to" between dates, avoid using the @ sign unless in web address.

Course Schedule

Week or Module	Activities/Assignments/Exams	Due Date
Week 1 1/10 to 1/15	Course Introduction and Lab Safety	Lab Safety Certification Exam Results
Week 2 1/16 to 1/21	What is Science and Motion	Lab #1
Week 3 1/22 to 1/28	Energy and Heat	
Week 4 1/29-2/4	Module 1 Review and Test	• Module 1 Test • Science Notebook Review 1 • 2/1/2022
Week 5 2/5-2/11	Waves and Electricity	
Week 6 2/12-2/18	Light and Properties of Matter	Lab #2
Week 7 2/19-2/25	Module 2 Review and Test	• Module 2 Test • Science Notebook Review 2 • 2/24/2022
Week 8 2/26-3/4	The Universe and the Solar System	
Week 9 3/5-3/11	Earth in Space and Earth	
Week 10 3/12-3/18	Spring Break	Spring Break
Week 11 3/19-3/25	Earth's Surface and Earth's Weather	Lab #3
Week 12 3/26-4/1	Module 3 Review and Test	• Module 3 Test • Science Notebook Review 3 • 3/31/2022
Week 13 4/2-4/8	The Origin of Life and Ecology	Lab #4
Week 14	Human Biology and Genetics	

Week or Module	Activities/Assignments/Exams	Due Date
4/9-4/15		
Week 15 4/16-4/22	Human Biology and Genetics	
Week 16 4/23-4/29	Module 4 Review and Test	• Module 4 Test • Science Notebook Review 4 • 4/26/2022
Finals Week 5/3 @ 1:00pm	Comprehensive Final Exam Tuesday 5/3/2022 @ 1:00pm	5/3/2022 @ 1:00pm

Note: Tables cannot continue to the next page. If the table continues to the next page, you will need to make a new table using the table tools for every page. Remember to add Alt Text.

References/Scientifically-Based Research/Additional Readings:

Required scientifically-based references/evidence for certification courses and applicable standards and professional associations.

- Atzori, P. (1996). Discovering CyberAntarctic: A Conversation with Knowbotics Research. *CTHEORY*. Available at: http://www.ctheory.com/
- Brown, J.S., Collins, A. & Duguid, S. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32-42.
- **Capobianco, B. M., DeLisi, J., & Radloff, J. (2018). Characterizing elementary teachers' enactment of high-leverage practices through engineering design-based science instruction. *Science Education*, *102*(2), 342-376.**
- Derry, S. (1992). Beyond symbolic processing: Expanding horizons in educational psychology. *Journal of Educational Psychology*, 413-418.
- Derry, S. (1996). Cognitive Schema Theory in the Constructivist Debate. In *Educational Psychologist*, 31(3/4), 163-174.
- Driver, R., Aasoko, H., Leach, J., Mortimer, E., Scott, P. (1994). Constructing scientific knowledge in the classroom. *Educational Researcher* , 23 (7), 5-12.
- Ernest, P. (1995). The one and the many. In L. Steffe & J. Gale (Eds.). *Constructivism in education* (pp.459-486). New Jersey: Lawrence Erlbaum Associates,Inc.
- **Estrella, G., Au, J., Jaeggi, S. M., & Collins, P. (2018). Is inquiry science instruction effective for English language learners? A meta-analytic review. *AERA open*, *4*(2), 2332858418767402.**

- Fosnot, C. (1996). Constructivism: A Psychological theory of learning. In C. Fosnot (Ed.) *Constructivism: Theory, perspectives, and practice*, (pp.8-33). New York: Teachers College Press.
- Gergen, K. (1995). Social construction and the educational process. In L. Steffe & J. Gale (Eds.). *Constructivism in education*, (pp.17-39). New Jersey: Lawrence Erlbaum Associates,Inc.
- **Kracl, C., & Harshbarger, D. (2017). Ask the Right Question: Using literature and higher-level thinking questions to enhance science instruction. *Science and Children*, *54*(9), 78.**
- **McComas, W. F. (2017). Understanding how science works: The nature of science as the foundation for science teaching and learning. *School Science Review*, *98*(365), 71-76**.
- **Marshall, J. C., Smart, J. B., & Alston, D. M. (2017). Inquiry-based instruction: A possible solution to improving student learning of both science concepts and scientific practices. *International journal of science and mathematics education*, *15*(5), 777-796.**
- **Mintzes, J. J. (2020). From constructivism to active learning in college science. In *Active Learning in College Science* (pp. 3-12). Springer, Cham.**
- **Reid-Martinez, K., & Grooms, L. D. (2021). Constructivism in 21st Century Online Learning. In *Handbook of Research on Modern Educational Technologies, Applications, and Management* (pp. 730-743). IGI Global.**
- **Swanson, H., & Clarke-Midura, J. (2021). Integrating formative assessment and feedback into scientific theory-building practices and instruction. *Assessment in Education: Principles, Policy & Practice*, 1-17.**
- von Glasersfeld, E. (1996).Introduction: Aspects of constructivism. In C. Fosnot (Ed.), *Constructivism: Theory, perspectives, and practice*, (pp.3-7). New York: Teachers College Press.
- Vygotsky, L. (1978). *Mind in Society: The Development of Higher Psychological Processes* MA: Harvard University Press.
- Wilson, B. & Cole, P. (1991) A review of cognitive teaching models. *Educational Technology Research and Development*, 39(4), 47-64.
- Wilson, B. (1997). The postmodern paradigm. In C. R. Dills and A. Romiszowski (Eds.), *Instructional development paradigms*. Englewood Cliffs NJ: Educational Technology Publications. Also available at: http://www.cudenver.edu/~bwilson/postmodern.html

Appendix A: Standards/Competencies

Course Objectives or Student Learning Outcomes	Standard or Competency
Module 1 Learning Goals: **Learning Goal 1:** The student will be able demonstrate that science is a way of thinking about and understanding your surroundings **Learning Goal 2:** The student will be able to demonstrate that net force is required for any change in a state of motion. **Learning Goal 3:** The student will be able to demonstrate that energy is transformed through working or heating, and the total amount remains constant. **Learning Goal 4:** The student will be able to demonstrate that a relationship exists between heat, temperature, and the motion and position of the molecules.	• **Science Standard I** • The science teacher manages classroom, field and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens. • **Science Standard II** • The science teacher understands the correct use of tools, materials, equipment and technologies. • **Science Standard VI** • The science teacher understands the history and nature of science. • **Science Standard VII** • The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions. • **Science Standard VIII** • The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in physical science.
Module 2 Learning Goals:	• **Science Standard I** • The science teacher manages classroom, field and laboratory activities to ensure the safety of

Course Objectives or Student Learning Outcomes	Standard or Competency
Learning Goal 1: The student will be able demonstrate that sound is transmitted as increased and decreased pressure waves that carry energy. **Learning Goal 2:** The student will be able demonstrate that electric and magnetic fields interact and can produce forces. **Learning Goal 3:** The student will be able demonstrate that light is electromagnetic energy that interacts with matter. **Learning Goal 4:** The student will be able demonstrate that different fields of study contributed to the model of the atom. **Learning Goal 5:** The student will be able demonstrate that electron structure will explain how and why atoms join together in certain numbers.	all students and the ethical care and treatment of organisms and specimens. • **Science Standard II** • The science teacher understands the correct use of tools, materials, equipment and technologies. • **Science Standard VI** • The science teacher understands the history and nature of science. • **Science Standard VII** • The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions. • **Science Standard VIII** • The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in physical science.
Module 3 Learning Goals: **Learning Goal 1**:The student will be able demonstrate that the night sky is filled with billions of stars, and the Sun is an ordinary star	• **Science Standard I** • The science teacher manages classroom, field and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens. • **Science Standard II** • The science teacher understands the correct use of tools, materials, equipment and technologies. • **Science Standard VI**

Course Objectives or Student Learning Outcomes	Standard or Competency
with an average brightness. **Learning Goal 2**:The student will be able demonstrate that the solar system is composed of the Sun and its orbiting planets, dwarf planets, and smaller solar system bodies. **Learning Goal 3**:The student will be able demonstrate that the way Earth moves in space defines how we measure the passage of time. **Learning Goal 4**:The student will be able demonstrate that Earth is a dynamic body that cycles materials on its surface and between its surface and interior. **Learning Goal 5**:The student will be able demonstrate that the surface of Earth is involved in an ongoing cycle of destruction and renewal. **Learning Goal 6**:The student will be able demonstrate that energy arriving from the Sun drives cycles in Earth's atmosphere,	• • The science teacher understands the history and nature of science. • **Science Standard VII** • The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions. • **Science Standard X** • The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in Earth and Space science.

Course Objectives or Student Learning Outcomes	Standard or Competency
and some of these cycles determine weather and climate.	
Module 4 Learning Goals: **Learning Goal 1:** The student will be able demonstrate that Earth and the life on it have changed over billions of years. **Learning Goal 2:** The student will be able demonstrate that Earth and its kinds of living things changed greatly over billions of years. **Learning Goal 3:** The student will be able demonstrate that everything is interconnected. **Learning Goal 4:** The student will be able demonstrate that all living things survive and reproduce only as a result of maintaining molecular genetic information that is passed from one generation to the next.	• **Science Standard I** • The science teacher manages classroom, field and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens. • **Science Standard II** • The science teacher understands the correct use of tools, materials, equipment and technologies. • **Science Standard VI** • The science teacher understands the history and nature of science. • **Science Standard VII** • The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions. • **Science Standard IX** • The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in life science.

Appendix B:

Required assignment/standard alignment matrix

Assignment/Module/ Course Activities	Standard or Competency
Lab Safety Certification	• **Science Standard I** • The science teacher manages classroom, field and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens.
Labs 1-4	• **Science Standard I** • The science teacher manages classroom, field and laboratory activities to ensure the safety of all students and the ethical care and treatment of organisms and specimens. • **Science Standard II** • The science teacher understands the correct use of tools, materials, equipment and technologies.
Module 1 Test	• **Science Standard VI** • The science teacher understands the history and nature of science. • **Science Standard VII** • The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions. • **Science Standard VIII** The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in physical science.
Module 2 Test	• **Science Standard VI** • The science teacher understands the history and nature of science. • **Science Standard VII** • The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions. • **Science Standard VIII** • The science teacher knows and understands the science content appropriate to teach the statewide

Assignment/Module/ Course Activities	Standard or Competency
	curriculum (Texas Essential Knowledge and Skills [TEKS]) in physical science.
Module 3 Test	• **Science Standard VI** • The science teacher understands the history and nature of science. • **Science Standard VII** • The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions. • **Science Standard X** • The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in Earth and Space science.
Module 4 Test	• **Science Standard VI** • The science teacher understands the history and nature of science. • **Science Standard VII** • The science teacher understands how science affects the daily lives of students and how science interacts with and influences personal and societal decisions. • **Science Standard IX** • The science teacher knows and understands the science content appropriate to teach the statewide curriculum (Texas Essential Knowledge and Skills [TEKS]) in life science.

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